

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
23 January 2003 (23.01.2003)

PCT

(10) International Publication Number
WO 03/007549 A1

(51) International Patent Classification⁷: H04L 12/24 (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(21) International Application Number: PCT/CH01/00434

(22) International Filing Date: 10 July 2001 (10.07.2001)

(25) Filing Language: English

(26) Publication Language: English

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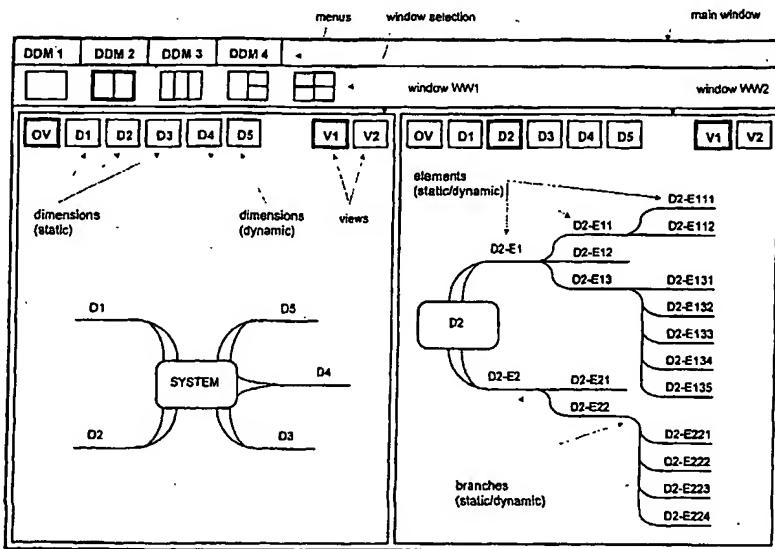
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND GRAPHICAL USER INTERFACE FOR CONTROLLING A TELECOMMUNICATION SYSTEM



WO 03/007549 A1

(57) Abstract: The inventive method allows to control wired to wireless, private or public telecommunication systems, such as private branch exchanges located on customer premises, local exchanges, mobile switching centers, cross-connect systems or complete private and public networks with interconnected managed objects which are visualised to users or maintenance personnel in at least one dimension (D1, D2, , Dn), in at least one view (V1, V2,) and in at least one window (WW1, WW2,) through a graphical user interface, comprising the steps of displaying the managed objects of the controlled telecommunication systems in a first view (V_{MM}) as elements (D1-E1, , D_x-E_y) of a mind map which comprises a structure with branches for every distinct group of elements or distinct elements in hierarchical flow.

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METHOD AND GRAPHICAL USER INTERFACE FOR CONTROLLING A
TELECOMMUNICATION SYSTEM

The present invention relates to a method and a graphical interface for controlling a telecommunication system according
5 to claim 1 and claim 10.

The present invention relates in particular to a method and a graphical user interface for controlling, configuring and preferably also maintaining, wired or wireless, private or public telecommunication systems, such as private branch
10 exchanges located on customer premises, local exchanges, mobile switching centers, cross-connect systems or complete private and public networks.

More particularly the present invention relates to a method and a graphical user interface designed for implementation in the
15 management plane of said equipment or networks.

BACKGROUND OF THE INVENTION

In recent years an increasing percentage of the previously used analog transmission and switching equipment in telecommunication networks has been replaced by digital systems primarily
20 for economic reasons. In addition digital equipment provides numerous new services and functions. However, due to the complexity and multi-functionality of the equipment, handling of the resulting systems has become difficult.

In the process of development of a new telecommunications
25 system it is advisable to involve all concerned parties on the developer side, in general the personnel of R&D, and on the user side, particularly the actual users of the systems as well as maintenance personnel, in order to iteratively find the ideal model which can be realised (see [1], Martin Cierjacks,

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Vorgangsmodellierung als Mittel zur Benutzerbeteiligung bei der objektorientierten Softwareentwicklung, Inaugural-Dissertation, Universität Trier 1999, pages 25-28).

Means used by said parties for describing a model differ 5 normally significantly. The developers will use formal logic and language while the users will describe their requirements in natural language by common sense. Due to differences in said communication means misunderstandings between the parties involved may therefore frequently occur.

10 In complex systems, such as advanced telecommunication systems, the interfaces provided to the users often comprise formalistic views such as hierarchical tree structures comprising system elements. Such formalistic views often contain insufficient information or information which can not be interpreted by 15 users due to incorporation of technical elements and language.

Performing the configuration of customer premises equipment such as a private branch exchange based on a formalistic user interface is usually done by a trained specialist. For a less skilled user such formalistic graphical interfaces may create 20 irresolvable problems.

However, with rising complexity of the system even the expert may require extended training, more detailed technical manuals and/or a lot of valuable time on site to set-up and configure a complex system.

25 In case that the installed and configured system does not perform up to expectation or simply does not deliver some of the services planned both the user and the trained expert may be helpless.

It would therefore be desirable to provide an improved method 30 and an improved graphical user interface by which a complex telecommunication system, can more easily be controlled.

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It would be desirable in particular to provide a method and a graphical user interface which facilitate configuration of a complex telecommunication system.

5 It would further be desirable to provide, a method and a graphical user interface which facilitate maintenance of a complex telecommunication system.

SUMMARY OF THE INVENTION

The above and other objects of the present invention are achieved by a method and a graphical user interface according 10 to claim 1 and claim 10 respectively.

The inventive method and graphical user interface allow to control wired or wireless, private or public telecommunication systems, such as private branch exchanges located on customer premises, local exchanges, mobile switching centers, cross-15 connect systems or complete private and public networks with interconnected managed objects which are visualised to users or maintenance personnel in at least one dimension, in at least one view and in at least one window through the graphical user interface, comprising the steps of displaying the managed 20 objects of the controlled telecommunication systems in a first view as elements of a mind map.

Instead of using a formalistic technical view of the controlled telecommunication system the invention proposes to use a mind map to display the managed objects and their interconnections.

25 A mind map allows to dissolve connections between managed objects which are layered in previously used views close to the final branch where the link to a managed object deviates from a highway of connections.

When looking for an element, for example DECT terminal M4, in a 30 tree structure as shown for example in figure 4, a user will follow a connection highway, possibly over more than one page

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and several element groups, such as servers, gateways, routers, switches, workstations to the group of DECT-terminals, where the link to DECT terminal M4 deviates (see also [2], Ascotel ISDN Telekommunikationssysteme, Ascotel 2025/2045/2065, System-
5 handbuch B, Version 5.0, Ascom Business Systems, Solothurn February 2001, menu-trees and configuration parameters, pages 5.31-5.44).

Mind maps however comprise structures with branches for every distinct group of elements or distinct element in a
10 hierarchical flow which allow a user to quickly and correctly visualise the controlled telecommunication system despite of its complexity.

Planning, set-up and configuration of the controlled telecommunication system is therefore significantly facilitated,
15 which allows to reduce project costs, including training and documentation expenditures considerably.

In order to optimise visualisation and interaction with the controlled telecommunication system several predominantly static dimensions, for a private branch exchange preferably the
20 topology of a controlled network, the geographical location of managed objects, the users of the managed objects and/or predominantly dynamic dimensions such as time variable interactions between managed objects are displayed through the graphical user interface. In a further dimension the graphical
25 user interface displays preferably also applications implemented within the system.

In a preferred embodiment of the invention the graphical user interface provides two or more windows displaying identical or different dimensions of the controlled telecommunication
30 system. A complex telecommunication system can therefore be viewed from different angles or dimensions which are most suitable to perform planned tasks.

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In [1], page 26, it is suggested to iteratively achieve symmetry of the models proposed by users and designers. However, in many cases, partly due to the heterogeneous requirements and notions of different users or different 5 designers, the optimum solution can not be found in a compromise. The inventive graphical user interface therefore provides in a preferred embodiment different views, such as said mind map view, a tree view and/or a table view for displaying said dimensions in corresponding windows.

10 This allows a user or maintenance personnel to select the most suitable view for a planned task. Elements of a certain category can often be configured most easily in a table view, in which common settings can be entered once and then copied to all other elements.

15 In order to set-up the systems elements can individually be configured and dragged and dropped within one or between two or more windows.

In a further embodiment of the invention the branches of the mind map, used for mutually connecting elements contained in 20 different levels of a dimension, provide access to or display static and/or dynamic states of the controlled telecommunications system such as present interactions between managed objects or current or accumulated traffic, costs or error data.

25 The branches contained in a mind map are therefore important elements which are suitable to display predominantly dynamic states of the systems by means of linked pop-up menus or by means of differently formatting said branches. A branch carrying a high traffic load may for example be drawn broader 30 while a branch on which a high number of errors had been accumulated could be highlighted red.

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Maintenance personnel could therefore detect problems or an overload of the system with a short look at the graphical user interface.

5 The graphical user interface is preferably adaptable to different users by means of a filter which provides for each user only access to the required parts of the system.

BRIEF DESCRIPTION OF THE DRAWINGS

Some of the objects and advantages of the present invention have been stated, others will appear when the following 10 description is considered together with the accompanying drawings, in which:

15 Figure 1 shows a first display provided by the inventive graphical interface with mind maps of a telecommunication system shown in two separate windows;

20 Figure 2 shows a second display provided by the inventive graphical interface with the mind map view of a network dimension of a telecommunication system, displaying a network and a sub-network thereof in a first and a second window;

25 Figure 3 shows a third display provided by the inventive graphical interface with dynamic states of a network displayed by means of a mind map in a first window and locations of equipment displayed in two additional windows;

Figure 4 shows a fourth display provided by the inventive graphical interface with a tree view of the network shown in a first window and locations of equipment shown in two additional windows;

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Figure 5 shows a fifth display provided by the inventive graphical interface with a mind map view of subscribers and with a tree view of configured routing functions and

5 Figure 6 shows a sixth display provided by the inventive graphical interface with a category of network elements shown in tree view and the same category of network elements shown in table view.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

10 The inventive method allows to control a telecommunication system by means of an improved graphical interface.

To support communication across a telecommunication network such as the ISDN (Integrated Services Digital Network) three distinct but interacting protocol stacks are required, namely,

15 the user-network signalling protocol on the D-channel, the interoffice signalling system CCS 7, and the user information protocol on the B-channel. Since the OSI-model alone is not sufficient to describe this communications, a specific ISDN protocol reference model has been defined (see [3], Jerry D.
20 Gibson, THE COMMUNICATIONS HANDBOOK, CRC PRESS LLC, Boca Raton 1997, chapter 42, Erwin P. Rathgeb, Integrated Services Digital Network (ISDN) and Broadband (B-ISDN), pages 577-590).

25 In order to separate user and signalling information the generic protocol block to model ISDN network elements is structured into three planes (see [3], pages 581-582):

The control plane (C) representing protocols used for transfer of signalling information.

The user plane (U) representing the blocks used for transfer of user information.

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The management plane (M) representing the functions needed to coordinate the activities in the U- and C-plane.

5 U- and C-plane are usually layered stacks, whereas the M-plane is represented as a monolithic block, because its functions can not be described properly by using the OSI concepts. However, the M-plane functions can be structured into plane related functions and functions which are related to specific layers in other planes.

10 As shown in [3], figure 42.4 a management plane is implemented in the entities located within a public telecommunications network such as local exchanges as well as in end systems or customer premises equipment such as private branch exchanges connected to the public network.

15 In order to integrate entities into existing networks, to connect additional equipment to already installed systems or to adapt installed system to user requirements, the management plane comprises corresponding modules and functions which allow the set-up and configuration of the concerned systems.

20 A modern private branch exchange is similar to a telephone company central office in that it is a digital switch complete with central control, program and call store, line and trunk interfaces and many further common features. The private branch exchange differs from central office switch primarily in its 25 capacity to serve lines and process calls (see [3], chapter 33, pages 433-449).

Control of switching modules integrated in a central office switch or in a private branch exchange is performed by an administrative module which comprises processing-, 30 communications- and storage modules as well as a terminal acting as man machine interface (see [4], Peter R. Gerke,

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Digitale Kommunikationsnetze, Springer-Verlag, Berlin 1991, page 150, figure 4.8).

A graphical user interface implemented within the management plane provides a display of the controlled telecommunication system or entity for example on the display of the terminal contained in the above mentioned administrative module or in a telecommunication management system.

Figure 1 shows a first display provided by the inventive graphical interface with mind maps of the controlled telecommunication system shown in two separate windows WW1, WW2, which are embedded in a main window which further comprises tool bars with drop-down menus and symbols for selecting window arrangements.

The graphical user interface in this preferred embodiment of the invention allows to view the controlled telecommunication system in five dimensions D1, ..., D5, in two different views V1, V2 and in a maximum of four windows WW1, ..., WW4 (see the symbols in the window selection tool bar).

In the first window WW1 the system overview (button OV) has been selected as well as view V1, which displays the system with the available dimensions D1, ..., D5 as a mind map. The system overview button OV is an option since the buttons for selection of a dimension D1; ...; D5 may be self-explanatory.

In the second window WW2 the second dimension D2 is displayed in mind map view V1 as well, with system elements D2-E1, ..., D2-E224, which correspond to managed objects within the telecommunication system.

In the first window WW1 it is shown that some of the system dimension D1, D2, D3 may completely or predominantly be static while other system dimensions D4, D5 may completely or predominantly be dynamic. The system elements D2-E1, ..., D2-E224

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shown in window WW2 may be static or may change dynamically. A major advantage of the selected mind map view V1 is the resolution of the branches which interconnect the system elements D2-E1, ..., D2-E224. Said branches may be static or 5 dynamically indicating the performance of the controlled system.

As described above mind maps comprise structures with branches for every distinct group of elements or distinct element in a hierarchical flow. This allows a user by means of the 10 implemented mind maps to quickly and correctly visualise the controlled telecommunication system despite of its complexity. The branches of the shown mind maps, which in other views are layered, may in addition be used to display static or dynamic system data which allow a user not only to detect but also to 15 locate the position of an incorrect system state, such as a malfunction, an increased error rate or an overload situation.

For private branch exchanges located on customer premises the graphical interface preferably allows to display five system dimensions.

20 Fig. 2 shows a second display provided by the inventive graphical user interface designed for controlling a private branch exchange comprising five selectable dimensions D_{NE} , D_{Lo} , D_{Su} , D_{Ro} and D_{Ap} . The private branch exchange in this case is the core of the controlled telecommunication system. The first, 25 predominantly static dimension D_{NE} allows to display the system as a network which, as shown in the mind map view V_{MM} of figure 2, can fully or partly be displayed in selected windows WW1, WW2. In a further static dimension D_{Lo} (see figure 3) the graphical user interface shows the physical location of the 30 managed objects within the customer premises. In a third static dimension D_{Su} (see figure 5) the graphical user interface shows the subscribers connected to the system. In a fourth predominantly dynamic dimension D_{Ro} the graphical user

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interface shows the established routing functions (see figure 5). In the last dimension D_{AP} , applications installed within the controlled telecommunications system are visualised.

5 In the first window WW1 shown in figure 2 the complete network of the controlled telecommunications system is displayed. The displayed network comprises two main branches, a sub-network for the marketing department and a sub-network for the production department which may be partly or fully displayed in this or further windows WW. The elements of the network, the 10 managed objects such as routers, switches, gateways, servers, workstations and terminals and their interconnections are shown in mind map view V_{MM} . The second window WW2 shows the enlarged mind map view of the sub-network for the marketing department only.

15 Fig. 3 shows a third display provided by the inventive graphical interface with dynamic states of the network displayed in mind map view V_{MM} in the first window WW1 and locations of equipment installed in the customer premises displayed in two additional windows WW2, WW3. In the second 20 window WW2 the locations of the marketing department including system connections are displayed. The third window WW3 shows the locations of the production department.

25 The user of the inventive graphical user interface can therefore visualise the complete telecommunication system including the related environment. The display of different dimensions D_{NE} , D_{Lo} , including in particular the display of customer premises, facilitates significantly the planning and setup of the telecommunication system since the complete system and its related environment can be visualised before physically 30 visiting customer premises.

After the setup and configuration the branches of the mind map, used for mutually connecting elements contained in different

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levels of a dimension, preferably provide access to or display static and/or dynamic states of the controlled telecommunications system such as present interactions between managed objects or current or accumulated traffic, costs or 5 error data.

The traffic load in the displayed branches may preferably be represented by a corresponding format such as the breadth or colour of the branches. As indicated in figure 3, window WW1 the branch leading to switch M1 is displayed broader indicating 10 occurrence of a relatively high traffic volume. Clicking a mouse button with the pointer on this branch may also open a pop-up window which contains, as shown in figure 3, related dynamic data such as traffic figures or error data.

In [1], page 26, it is suggested to iteratively achieve 15 symmetry of the models proposed by users and designers. However, in many cases, partly due to the heterogeneous requirements and notions of different users or different designers, the optimum solution can not be found in a compromise on a common model. The inventive graphical user 20 interface therefore provides in a preferred embodiment different views, such as said mind map view V_{MM} , a tree view V_{TR} and/or a table view V_{TB} for displaying said dimensions D_{NE} ; D_{Lo} ; D_{Su} ; D_{Ro} ; D_{Ap} in corresponding windows WW1, ..., WW4, ... WWn.

Figure 4 shows a fourth display provided by the inventive 25 graphical interface with a tree view V_{TR} of the network dimension D_{NE} shown in the first window WW1 and locations of equipment shown in two additional windows WW2, WW3.

In some cases a tree view V_{TR} may be preferable to a user. For example in case that complexity of presented data is low, a 30 simple formalistic view would be sufficient.

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Figure 5 shows a fifth display provided by the inventive graphical interface with a mind map view V_{MM} of subscribers and with a tree view V_{TR} of configured routing functions.

5 In case that routing data concern only a few subscribers then the tree view V_{TR} may be sufficient. In case that routing settings are more complex, then preferably the mind map view V_{MM} is selected, which allows the user of the graphical interface to visualise the complete routing organisation.

10 Figure 6 shows a sixth display provided by the inventive graphical interface with a category of network elements shown in tree view V_{TR} and the same category of network elements shown in table view V_{TB} .

15 A user or maintenance personnel may require an overview of all servers installed. In order to configure the displayed servers the user could sequentially click on each server invoking the related configuration window as shown for example in figure 4, window WW1. Since at least part of the configuration data may be identical for most of the servers it may be easier to use the table view V_{TB} for configuration purposes. Common data 20 entered for a first server could in this view V_{TB} easily be copied to the rows of the remaining servers.

25 Table view V_{TR} may however only be useful for maintenance personnel. A local administrator may prefer to use only mind map views V_{MM} . Further the local administrator may require to display only part of the dimensions and part of the elements. The complete model of the telecommunication system is therefore preferably viewed to different users through a filter according to an access code assigned.

30 Handling and configuring of a controlled telecommunication system is therefore significantly facilitated by means of the inventive graphical user interface. Elements D1-E1, ..., Dx-Ey can easily be configured as well as be dragged and dropped

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within one or between two or more windows WW1, WW2, In figure 5 for example routing of a call incoming on number 437 3204 can easily be routed to subscriber Berger who is working in division 2 of the marketing department. The administrator 5 simply drags the name or symbol related to the concerned subscriber from the first window WW1, in which the subscriber dimension D_{SU} is displayed in mind map view V_{MM} , to the concerned element in the second window WW2, in which the routing dimension D_{RO} is displayed in tree view V_{TR} . In addition 10 the routing format, top down or cyclic, can be displayed with icons, thus facilitating system apprehension.

A subscriber (Taylor) can also be reallocated to a different department by means of dragging and dropping the concerned symbols accordingly within the first window WW1 or to a 15 different window in which the new location is displayed.

A further advantage of the mind map view V_{MM} can be recognised from the first window WW1 displayed in figure 5 in which the status of the subscribers is indicated. Internal subscriber Siegfried has called external subscriber Hill. External 20 subscriber Grand has called internal subscriber Johnson. Call connections are preferably visualised by differently formatting the concerned branches of the mind map. In case that a line is interrupted, for example due to a broken cable, then the fault can easily be located by setting up a test connection (Nunn >>> 25 Miller) which will only partially be established .

Numerous advantages of the inventive graphical user interface have been described above for its implementation in conjunction with a private branch exchange. However, the discussed graphical interface can also advantageously be used for 30 controlling further telecommunication systems, such as local exchanges, mobile switching centers, cross-connect systems or complete private and public networks.

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5 [1] Martin Cierjacks, Vorgangsmodellierung als Mittel zur Benutzerbeteiligung bei der objektorientierten Softwareentwicklung, Inaugural-Dissertation, Universität Trier 1999

[2] Ascotel ISDN Telekommunikationssysteme, Ascotel 2025/2045/2065, Systemhandbuch B, Version 5.0, Ascom Business Systems, Solothurn February 2001

10 [3] Jerry D. Gibson, THE COMMUNICATIONS HANDBOOK, CRC PRESS LLC, Boca Raton 1997

[4] Peter R. Gerke, Digitale Kommunikationsnetze, Springer-Verlag, Berlin 1991

CLAIMS

1. Method for controlling wired or wireless, private or public telecommunication systems, such as private branch exchanges located on customer premises, local exchanges, mobile switching centers, cross-connect systems or complete private and public networks with interconnected managed objects which are visualised to users or maintenance personnel in at least one dimension (D₁, D₂, ..., D_n), in at least one view (V₁, V₂, ...) and in at least one window (WW₁, WW₂, ...) through a graphical user interface, comprising the steps of displaying the managed objects of the controlled telecommunication systems in a first view (V_{MM}) as elements (D₁-E₁, ..., D_x-E_y) of a mind map which comprises a structure with branches for every distinct group of elements or distinct elements in a hierarchical flow.
5
2. Method according to claim 1, in which predominantly static dimensions (D_{NE}, D_{Lo}, D_{Su}) such as the topology of a controlled network (D_{NE}), the geographical location of managed objects (D_{Lo}), the users (D_{Su}) of the managed objects and/or predominantly dynamic dimensions (D_{Ro}, D_{Ap}) such as time variable interactions between managed objects are displayed through the graphical user interface.
10
3. Method according to claim 1 or 2, in which two or more windows (WW₁, WW₂, ...) are provided displaying identical or different dimensions (D_{NE}; D_{Lo}; D_{Su}; D_{Ro}; D_{Ap}) of the controlled telecommunication system.
15
4. Method according to claim 3, in which different views (V₁, V₂, ...), such as said mind map view (V_{MM}), a tree view (V_{TR}) and/or a table view (V_{TB}), are selected for displaying said dimensions (D_{NE}; D_{Lo}; D_{Su}; D_{Ro}; D_{Ap}) in corresponding windows (WW₁, WW₂, ...).
20

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5. Method according to one of the claims 1-4, in which elements (D1-E1, ..., Dx-Ey) can be dragged and dropped within one or between two or more windows (WW1, WW2, ...).
10. Method according to one of the claims 1-5, in which the branches of the mind map, used for connecting elements (D1-E1, ..., Dx-Ey) of a dimension (D1; D2; ...), provide access to or display static and/or dynamic states of the controlled telecommunications system such as present interactions between managed objects or current or accumulated traffic, costs or error data.
15. Method according to one of the claims 1-6, in which elements (D1-E1, ..., Dx-Ey) of the controlled telecommunication system are displayed in hierarchical order or by category.
20. 8. Method according to one of the claims 1-7, in which elements (D1-E1, ..., Dx-Ey) of the controlled telecommunication system are configured individually or, preferably by means of a table, by category.
25. 9. Method according to one of the claims 1-8, in which elements (D1-E1, ..., Dx-Ey) or branches are filtered according to an access code assigned to users or maintenance personnel of the graphical user interface.
30. 10. Graphical user interface for controlling wired or wireless, private or public telecommunication systems, such as private branch exchanges located on customer premises, local exchanges, mobile switching centers, cross-connect systems or complete private and public networks with interconnected managed objects which are visualised to users or maintenance personnel in at least one dimension (D1, D2, ..., Dn), in at least one view (V1, V2, ...) and in at least one window (WW1, WW2, ...), **characterised in**, that managed objects of the controlled telecommunication systems

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can be displayed in a first view (V_{MM}) as elements ($D1-E1, \dots, Dx-Ey$) of a mind map which comprises a structure with branches for every distinct group of elements or distinct elements in a hierarchical flow.

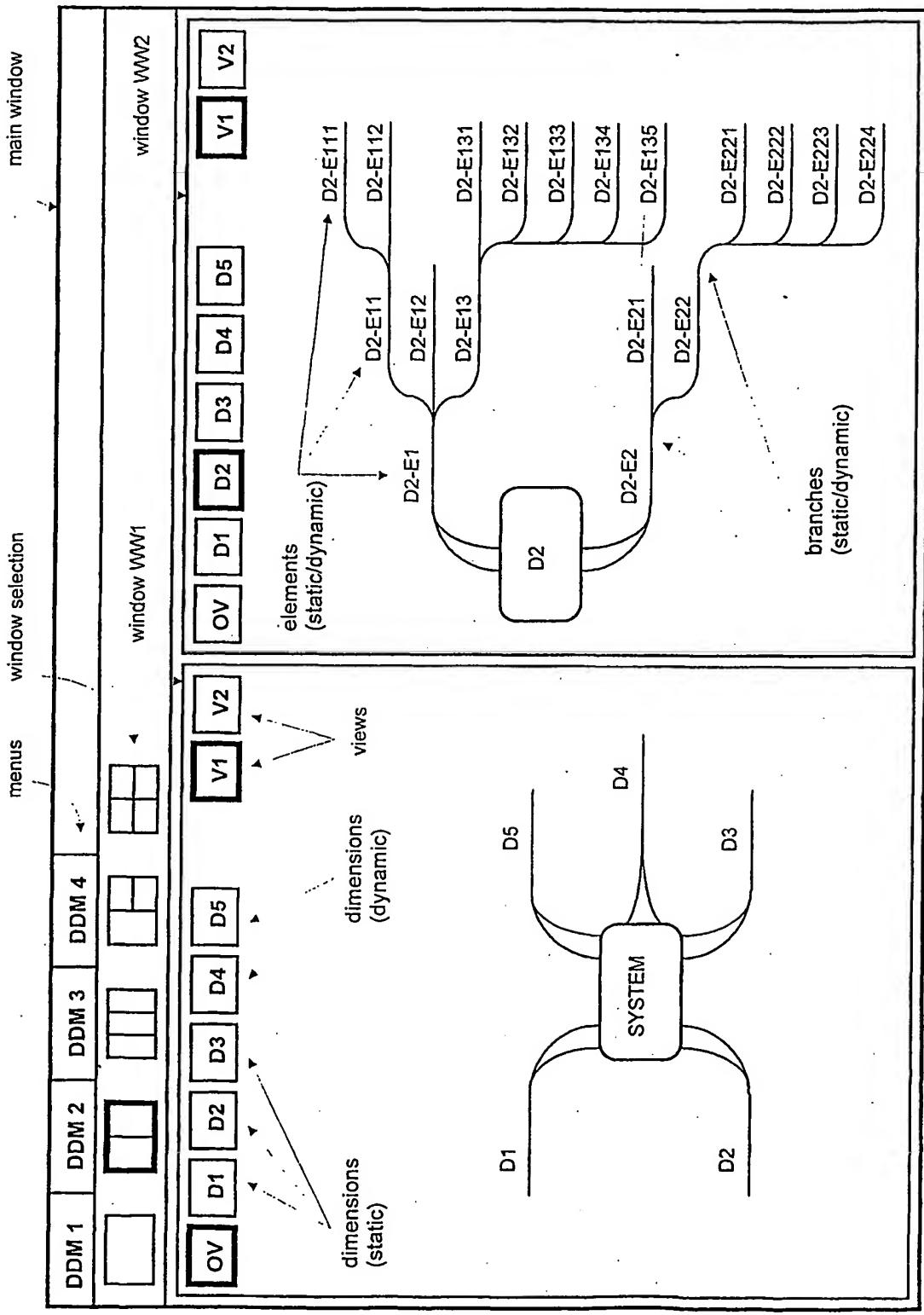
- 5 11. Graphical user interface according to claim 10, in which predominantly static dimensions (D_{NE}, D_{Lo}, D_{Su}) such as the topology of a controlled network (D_{NE}), the geographical location of managed objects (D_{Lo}), the users (D_{Su}) of the managed objects and/or predominantly dynamic dimensions
10 (D_{Ro}, D_{Ap}) such as time variable interactions between managed objects can be displayed through the graphical user interface.
12. Graphical user interface according to claim 10 or 11, in which two or more windows ($WW1, WW2, \dots$) are selectable displaying identical or different dimensions ($D_{NE}; D_{Lo}; D_{Su}; D_{Ro}; D_{Ap}$) of the controlled telecommunication system.
15
13. Graphical user interface according to claim 10, 11, or 12, in which different views ($V1, V2, \dots$), such as said mind map view (V_{MM}), a tree view (V_{TR}) and/or a table view (V_{TB}), are selectable for displaying said dimensions ($D_{NE}; D_{Lo}; D_{Su}; D_{Ro}; D_{Ap}$) in corresponding windows ($WW1, WW2, \dots$).
20
14. Graphical user interface according to one of the claims 10-13, designed in such a way that elements ($D1-E1, \dots, Dx-Ey$) can be dragged and dropped within one or between two or more windows ($WW1, WW2, \dots$).
25
15. Graphical user interface according to one of the claims 10-14, in which the branches of the mind map, used for connecting elements ($D1-E1, \dots, Dx-Ey$) of a dimension ($D1; D2; \dots$), are designed to provide access to or to display static and/or dynamic states of the controlled telecommunications system such as present interactions
30

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between managed objects or current or accumulated traffic, costs or error data.

16. Graphical user interface according to one of the claims 10-15 designed in such a way that elements (D1-E1, ..., Dx-Ey) of the controlled telecommunication system can be displayed in hierarchical order or by category.
- 5
17. Graphical user interface according to one of the claims 10-16, in which elements (D1-E1, ..., Dx-Ey) of the controlled telecommunication system can be configured individually or, 10 preferably by means of a table, by category.
18. Graphical user interface according to one of the claims 10-17, comprising a filter designed to filter elements (D1-E1, ..., Dx-Ey) or branches according to an access code assigned to users or maintenance personnel of the graphical user 15 interface.

Figure 1



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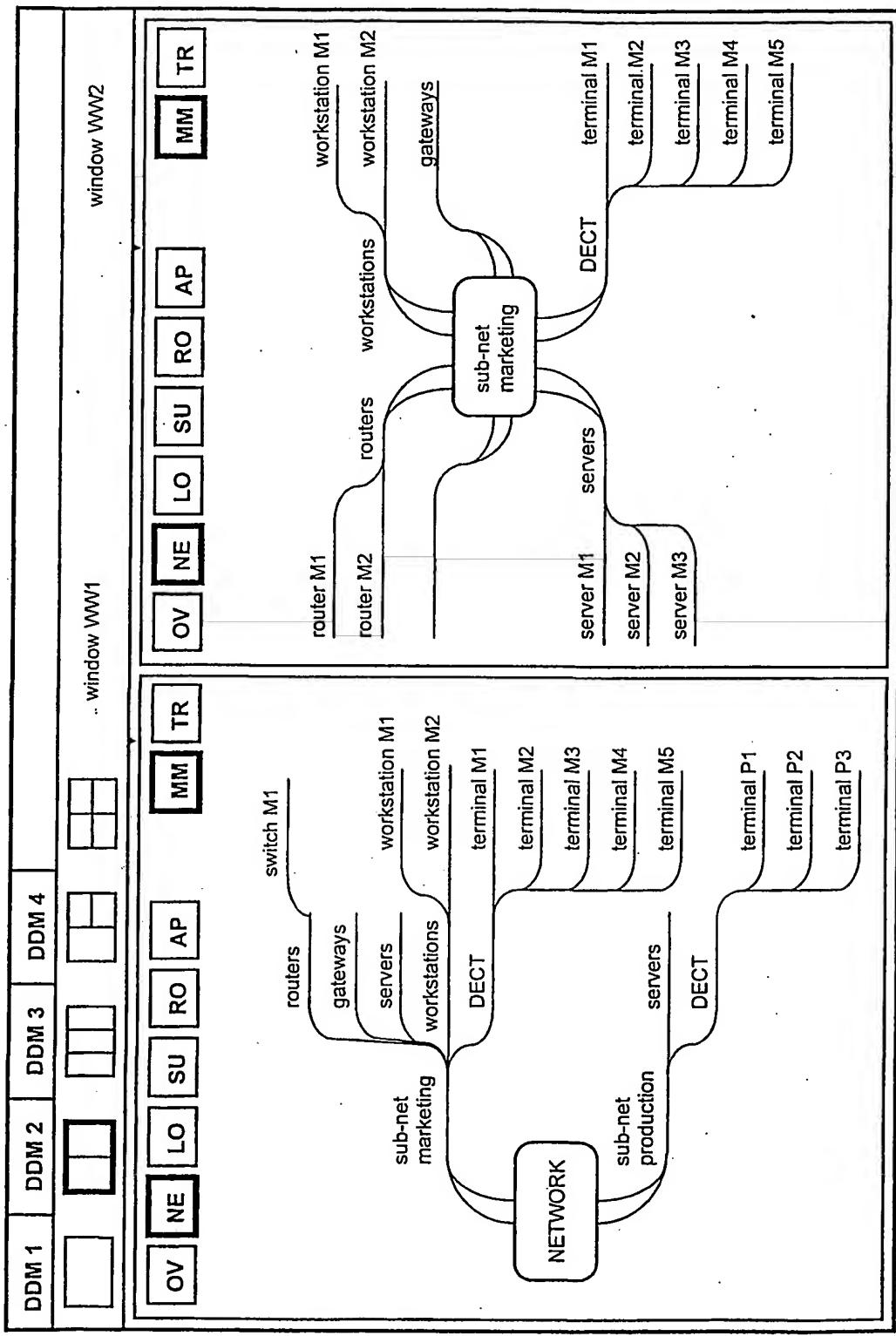


Figure 2

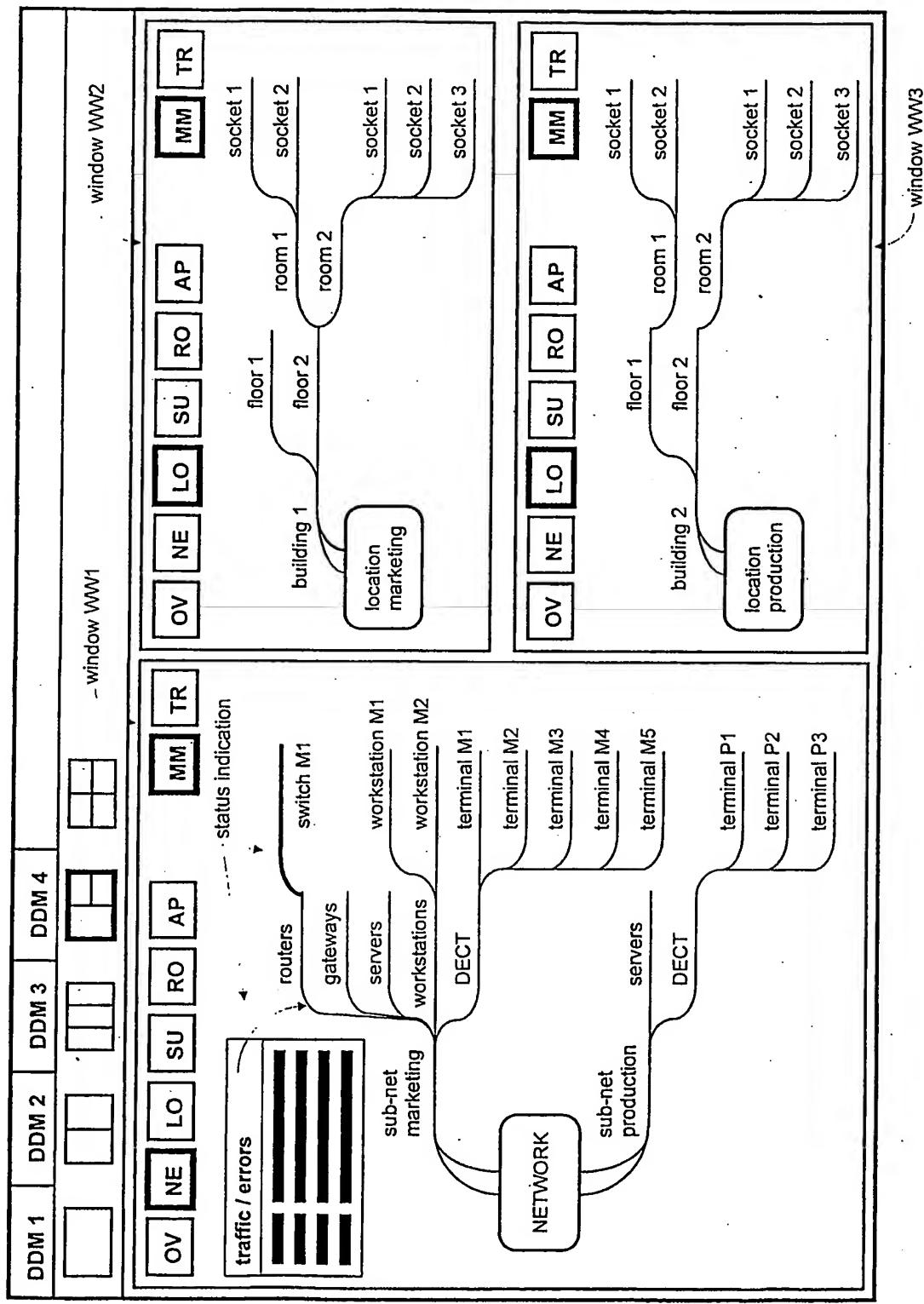


Figure 3

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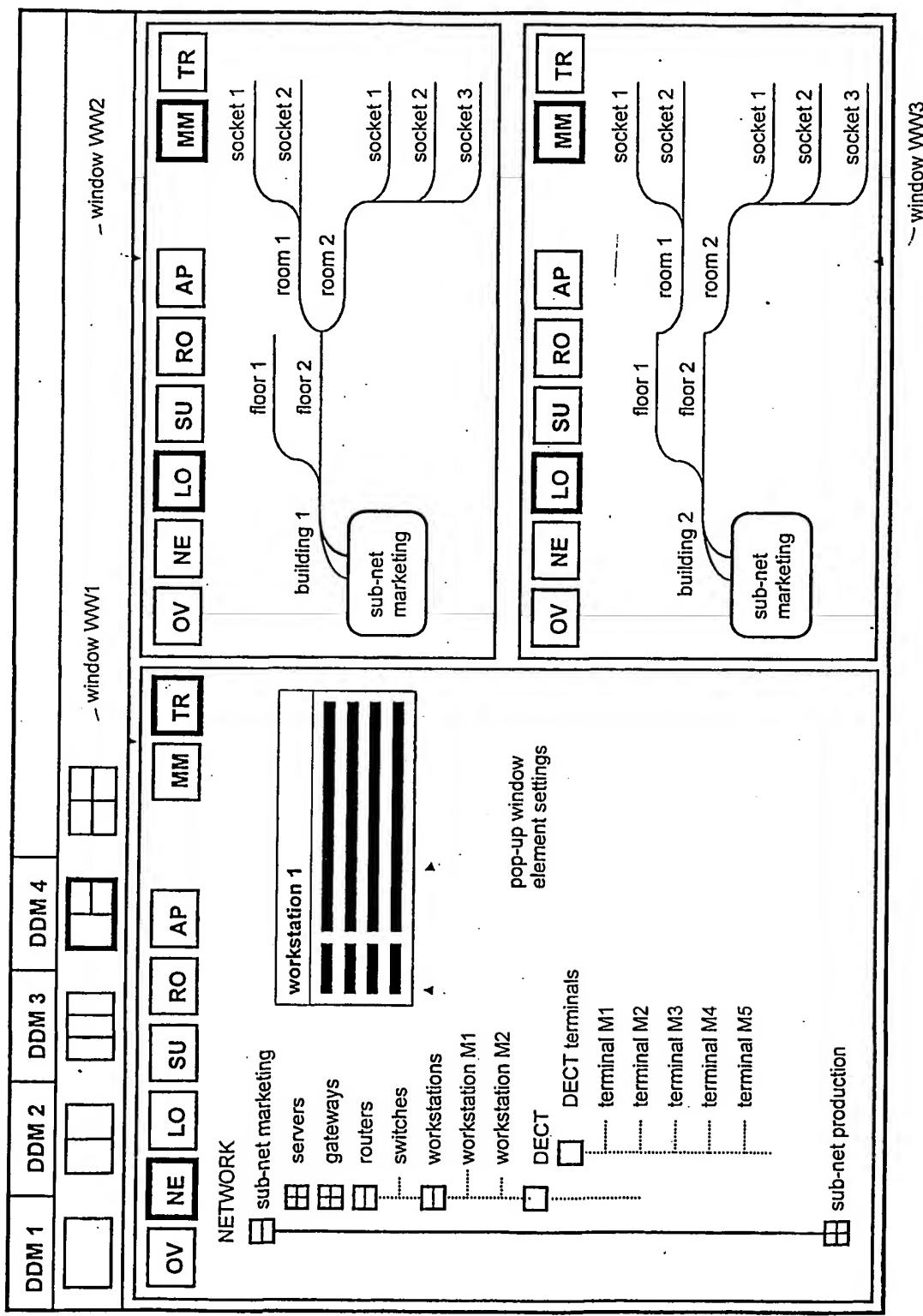


Figure 4

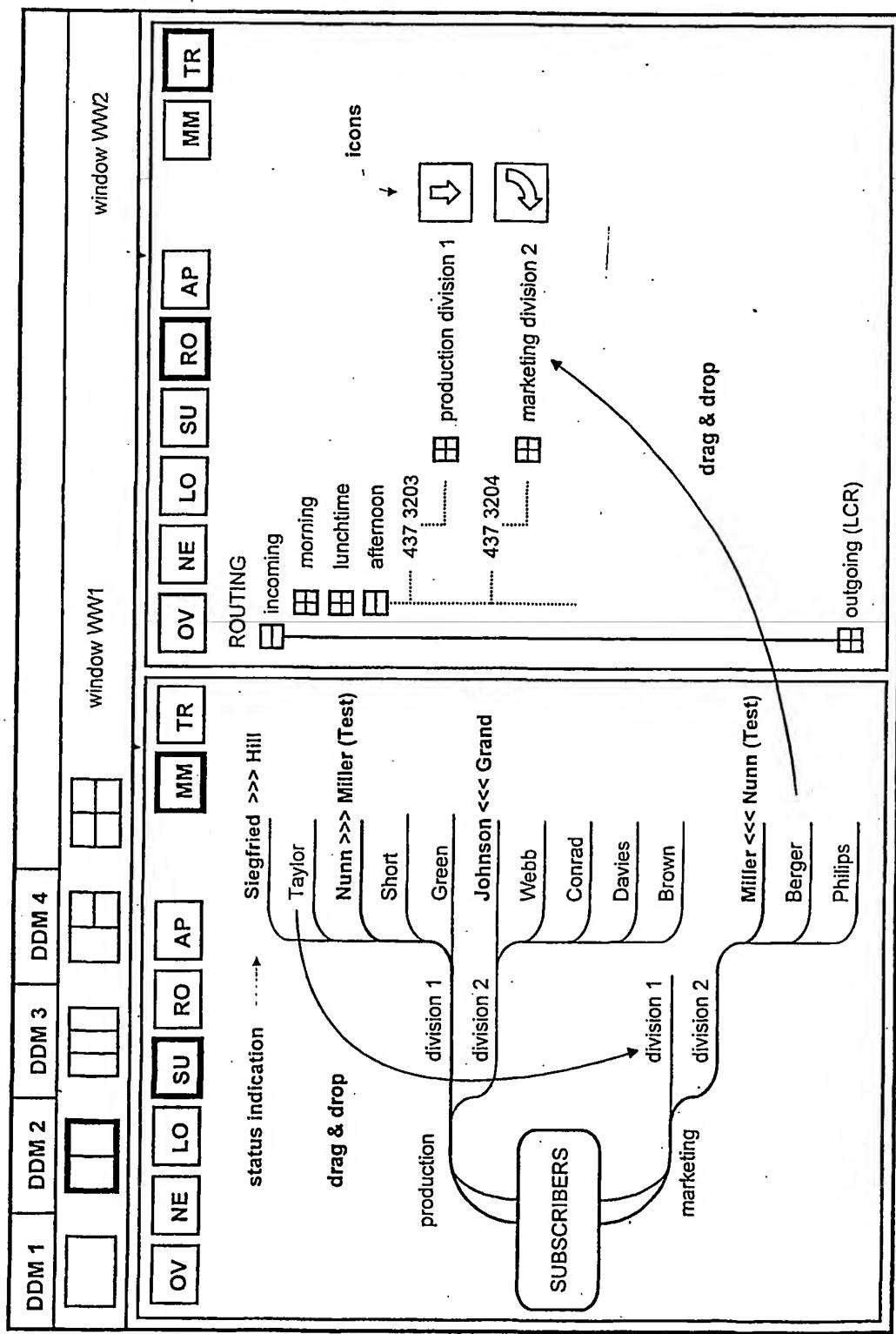
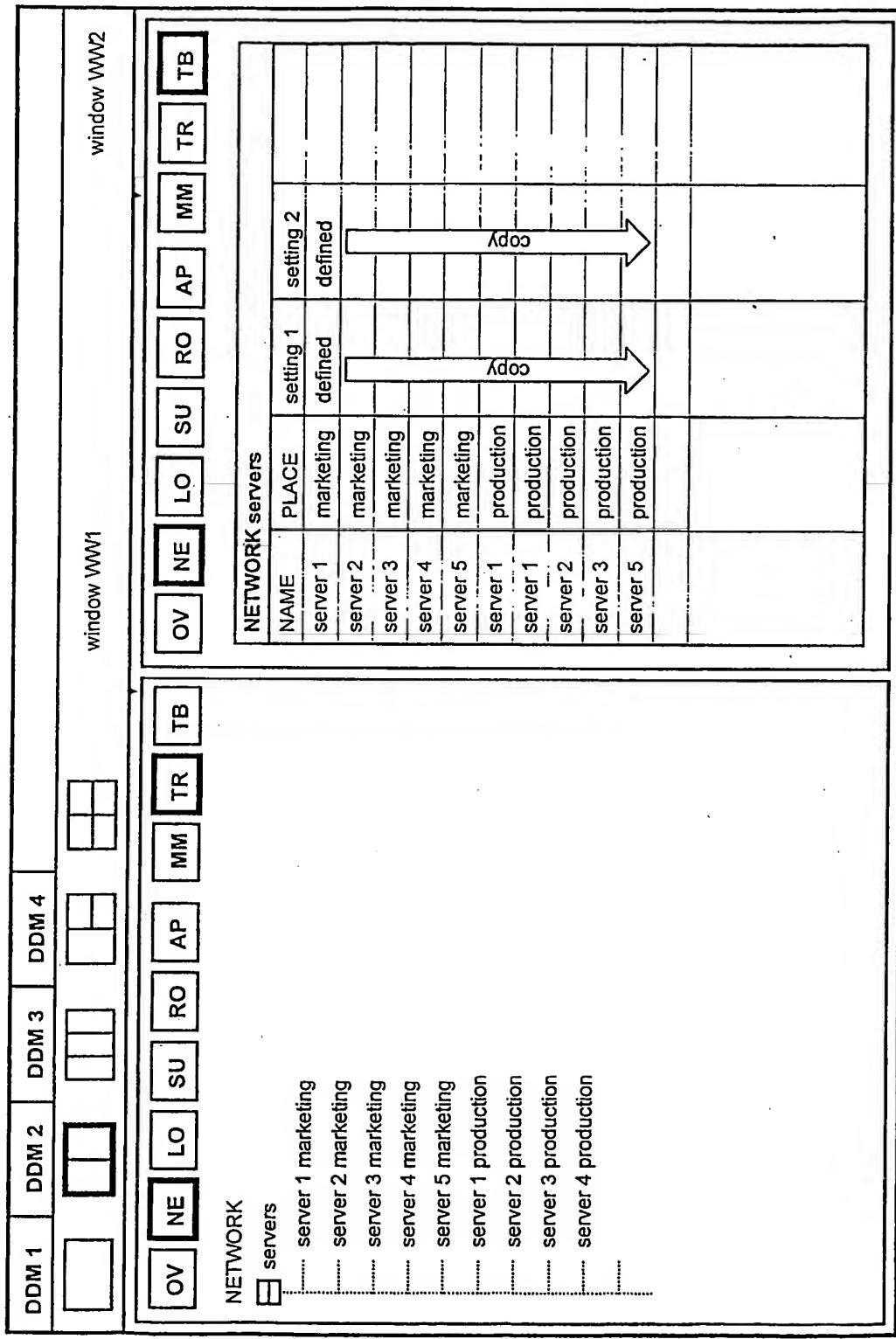


Figure 5

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Figure 6



INTERNATIONAL SEARCH REPORT

In International Application No
PCT/CH 01/00434A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 HO4L12/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 HO4L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, IBM-TDB, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	STATHATOS K ET AL: "Consistency and performance of concurrent interactive database applications" DATA ENGINEERING, 1996. PROCEEDINGS OF THE TWELFTH INTERNATIONAL CONFERENCE ON NEW ORLEANS, LA, USA 26 FEB.-1 MARCH 1996, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US, 26 February 1996 (1996-02-26), pages 602-609, XP010158962 ISBN: 0-8186-7240-4 abstract page 602, column 2, line 4-16 paragraph '02.1' paragraph '03.1' paragraph '03.2' paragraph '04.0'	1-5, 7-14, 16-18
A	----- -/-	6,15

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the international search

15 April 2002

Date of mailing of the international search report

24/04/2002

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GOTTSCHALK K D: "NETVIEW VERSION 2 RELEASE 3 GRAPHIC MONITOR FACILITY: NETWORK MANAGEMENT GRAPHICS SUPPORT FOR THE 1990S" IBM SYSTEMS JOURNAL, IBM CORP. ARMONK, NEW YORK, US, vol. 31, no. 2, 1992, pages 223-251, XP000371885 ISSN: 0018-8670 abstract	1-3,7, 9-11,13, 16,18
A	page 232, column 1, line 10 -page 237, column 2, line 16 page 242, column 2, line 16 -page 244, column 1, line 17 figures 15-20 ---	4-6,8, 12,14, 15,17
X	BERRY T ET AL: "Innovative graphical interfaces using object databases for power system analysis and control" PEOPLE IN CONTROL. INTERNATIONAL CONFERENCE ON HUMAN INTERFACES IN CONTROL ROOM, COCKPITS AND COMMAND CENTRES (IEE CONF. PUBL. NO.463), PROCEEDINGS OF INTERNATIONAL CONFERENCE ON PEOPLE IN CONTROL (HUMAN INTERFACES IN CONTROL ROOMS, COCKPITS AND COMM, pages 200-205, XP002195821 1999, London, UK, IEE, UK ISBN: 0-85296-715-2 the whole document	1-4,6,7, 10-13, 15,16
A	TAKKINEN J ET AL: "CAFE: a conceptual model for managing information in electronic mail" SYSTEM SCIENCES, 1998., PROCEEDINGS OF THE THIRTY-FIRST HAWAII INTERNATIONAL CONFERENCE ON KOHALA COAST, HI, USA 6-9 JAN. 1998, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US, 6 January 1998 (1998-01-06), pages 44-53, XP010262714 ISBN: 0-8186-8255-8 the whole document	5,8,9,14
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